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27 March 1981

East Europe Report

SCIENTIFIC AFFAIRS

No. 698

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CONTENTS

HUNGARY

R-10 COMPUTER AS PART OF MARS SYSTEM ON OCEANOGRAPHIC VESSEL

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 1, 1981 pp 31-35

[Article by Ivan Fedorovich Glumov, director of the Yuzhmorgeologia Research Institute, Janos Kazmer, director of the Videoton Computer Technology Factory, and Dr Pal Muller, director of the Lorand Eotvos Geophysical Institute: "Navigational-Geophysical Ocean Research Systems Based on an R-10 Computer"]

[Text] Ocean research is a special, quickly developing area of minicomputer application. The article describes the successful utilization of Hungarian hardware on geophysical ocean research ships. R-10 computer centers organize the navigational-geophysical data collection and processing functions of the MARS system, developed through Soviet-Hungarian cooperation; the computer centers were supplemented with special units and provided with the necessary software for this purpose. The article also turns to further possibilities of the next VT generation, the R-11. (Arrived: 16 May 1980.)

Requirements and Automation Tasks of Modern Ocean Research

The importance of seas and oceans in ensuring raw material resources for mankind is increasing very quickly. Already the continental shelves provide one quarter of our most important energy source, oil. Instrumented ocean research has taken on powerful proportions, one third of the sum spent on geophysical research is spent here. The extraordinarily high costs made it timely to construct special research vessels with which a whole series of geophysical operations can be carried out at one time. This makes it possible to decrease the time needed for research and to study from many sides the geological structure under the sea. Geophysical data--primarily in the case of seismic methods based on the creation of elastic waves--provide a great deal of information (at a speed of 32-96 Kbytes per second), changing quickly in time, which, according to the unwritten rules of modern digital technology, must be recorded on magnetic tape. The large geophysical computer centers are on dry land far from the areas of ocean research. Long months elapse between recording and processing. This deprives the on-board geophysicists of the possibility of judging the geological value of primary information and quickly optimizing the recording methods and parameters.

A solution to the problem was obvious--a computer center had to be installed on the ship with which data could be processed en route, displaying the geophysical profiles, after the study of which the recording parameters could be optimized.

This simple formulation of the task does not suggest those difficulties which a computer technology expert faces on a geophysical research vessel. Here are a few examples:

--Real-time handling and processing of the seismic data from a volume of seismograms requires a very fast computer and divided memory allocation (DMA).

--The computer center must be shock proof so that it is capable of functioning even with an oscillation of 5-6 bal when at sea.

--Modern navigation, the precision requirements of getting fixes, makes it necessary to use artificial satellites and Doppler instruments, which also require a fast computer.

--Complex research requires simultaneous data processing for several geophysical methods (seismic, gravitational, magnetic).

--Ships prospecting for raw materials are of small size so the computerized instrument complex must fit into a small cabin space.

Development of on-board real-time pre-processing systems is an expensive, complex task which it is useful to tie in with the solution of other important technological, instrumentation and navigation problems of ocean geophysical research. In the final analysis every effort should be directed at increasing the geological efficiency of ocean research. The most important timely tasks in this are the following:

--improving the resolution of surveys and the reliability of geological structural information;

--improving productivity and the quality of oceanic geophysical data, increasing the number of channels and decreasing noise;

--automation of the recording process, real-time display and checking of geophysical profiles; and

--exploiting new research procedures which can be achieved by the introduction of computer technology.

Selecting and Modifying On-Board Computers for Ocean Research

Taking into consideration and making use of every viewpoint raised in the course of analysis one can increase the efficiency of ocean research only with the aid of a completely automated, computerized on-board data collection and data processing system. A key question was the selection of a suitable computer, of a size to fit into the narrow space on board but which also met the requirements on the basis of its speed and peripheral selection. Of the equipment of socialist manufacture available to us the R-10 computer of Videoton proved most suitable for this purpose. The speed and size of the computer and, not least of all, the fact that its peripherals could be well modified for navigational purposes justified

the choice. It was possible to make the fixed head disk memories and line printers suitable for reliable operation even with ship inclines and shocks corresponding to an oscillation of 6-7 bal.

The Complex Geophysical-Navigational MARS System

After selecting the base computer we could begin, in 1976, to create the so-called MARS system within the framework of the "Intermorgeo" program as part of Soviet-Hungarian OMFB [National Technical Development Committee] and GKNT [expansion unknown] cooperation. (The Hungarian institutions participating in the program are Videoton, the ELGI [Lorand Eotvos Geophysical Institute], the MOM [Hungarian Optical Works], the SZAMKI [Computer Technology Research Institute], and the OKGT [National Oil and Gas Industry Trust]. From the Soviet side they are: the NPO Yuzhmorgeo, the PO Yuzhmorgeologia and the OKB VT RRTI.) The developmental work was successful. Several ships have been equipped with the system already, including the Issledovatyel, the Kurentsov and the Feodosia, which are doing complex geophysical research at sea.

In the hierarchy of automated navigational-geophysical on-board systems the MARS system represents a higher order step since in addition to data collection and delayed pre-processing it also does real-time geophysical express data processing. The developmental program for the MARS-2 version includes the construction of a special geophysical ship, integrated navigation equipment, a real-time seismic system, gravi-magnetic units and R-10 computer centers and the development of special geophysical peripherals and of geophysical and navigational software.

MARS is built in a modular system so further expansion and adaptation in accordance with the requirements of oceanic geophysical work is possible (Figure 1). The free channels of the DMA multiplexer serve the same purpose.

The navigational system is also built on the R-10 computer. The fact that the computers operating on the vessel are of the same type facilitates service and parts supply. The integrated navigational system contains digital receiving indicators for the radio navigation and radio geodesy network, a sputnik receiving indicator, a Doppler speedometer, a normal speedometer, a gyrocompass, and a gyrorudder. The program system ensures control over the collection of all navigational data and optimized processing thereof with the use of the algorithms of Kalman filters for the purpose of calculating the parameters of ship movement and recording them on magnetic tape. On the basis of information received from artificial satellites passing over the ship the computer immediately determines the coordinates and, taking into consideration also the meteorological data, the guidance of the ship is completely automatic, according to the program provided. The on-board seismic system also gets control signals from navigation in accordance with the cycle times of the selected observation parameters. Modern navigation makes possible three-shift observations even on distant oceans.

The Gravitation and Magnetic Instruments

Since the load on the seismic center is substantially greater the collection and processing of gravitational and magnetic data is shifted to the navigational computer. The on-board gravitation instrument unit consists of GAK-ZS3 gravimeters

and a gyrostabilized platform mounted in parallel. The combined closure precision in determining gravitational anomalies is plus or minus one mgal after a 3-5 day measurement series. The gravitation measurement data go through an interface directly into the navigation computer where they are immediately processed, taking into consideration the new navigation data, and the results are then displayed graphically or printed out.

The on-board magnetic instruments are, on the one hand, quantum gradient measuring magnetometers (KMMG-1) and, on the other hand, oceanic proton precession magnetometers (MMP-2). The sonde of the proton instrument is placed in a suspended gondola, its measurement domain embraces the entire breadth; the registering stage is on board. The gradient meter measures the magnetic field with a precision of plus or minus 0.02 gamma. The path for collecting and processing magnetic data is similar to that for gravitational data.

The On-Board Seismic Center

The task of the on-board geophysical center is to handle and perform real-time pre-processing on a mass of seismic data flowing in with great speed, in the 18-24 second pauses between shocks. This task can be carried out only with suitable memory allocation and autonomous control of key peripherals because the mass of data, exceeding the capacity of the operational memory, must be sent on with great speed while the central processor carries out other tasks. For this reason the R-10 computer is supplied with a DMA, the 8-channel multiplexer of which connects with the following units, in order of their priority:

--disk memory,
--seismic receiving instrument,
--magnetic tape data carrier,
--special array processor.

The free DMA channels offer further possibilities for connecting more processors into the hierarchic system, for example to do speed analysis or to connect new adapters.

From the viewpoint of computer technology the special (or array) processor merits special attention, which for the first time in Hungary has been connected organically into the configuration of a computer family. The special processor solves the speed defect for real-time seismic processing. Certain filtering and processing operations in ocean research (for example, the convolution integral) require a speed greater by an order of magnitude than the speed of the R-10. The special processor uses the basic processor of the computer only for the time needed to pass on the data, otherwise it carries out its operations in its own fast 16 Kword semiconductor operational storage, but there is also a possibility for floating decimal storage of the results of partial operations up to 1 Kwords. The cycle time for one multiplication and addition is 250 ns. In addition to traditional mathematical operations it also performs several geophysical operations electronically, directly with hardware.

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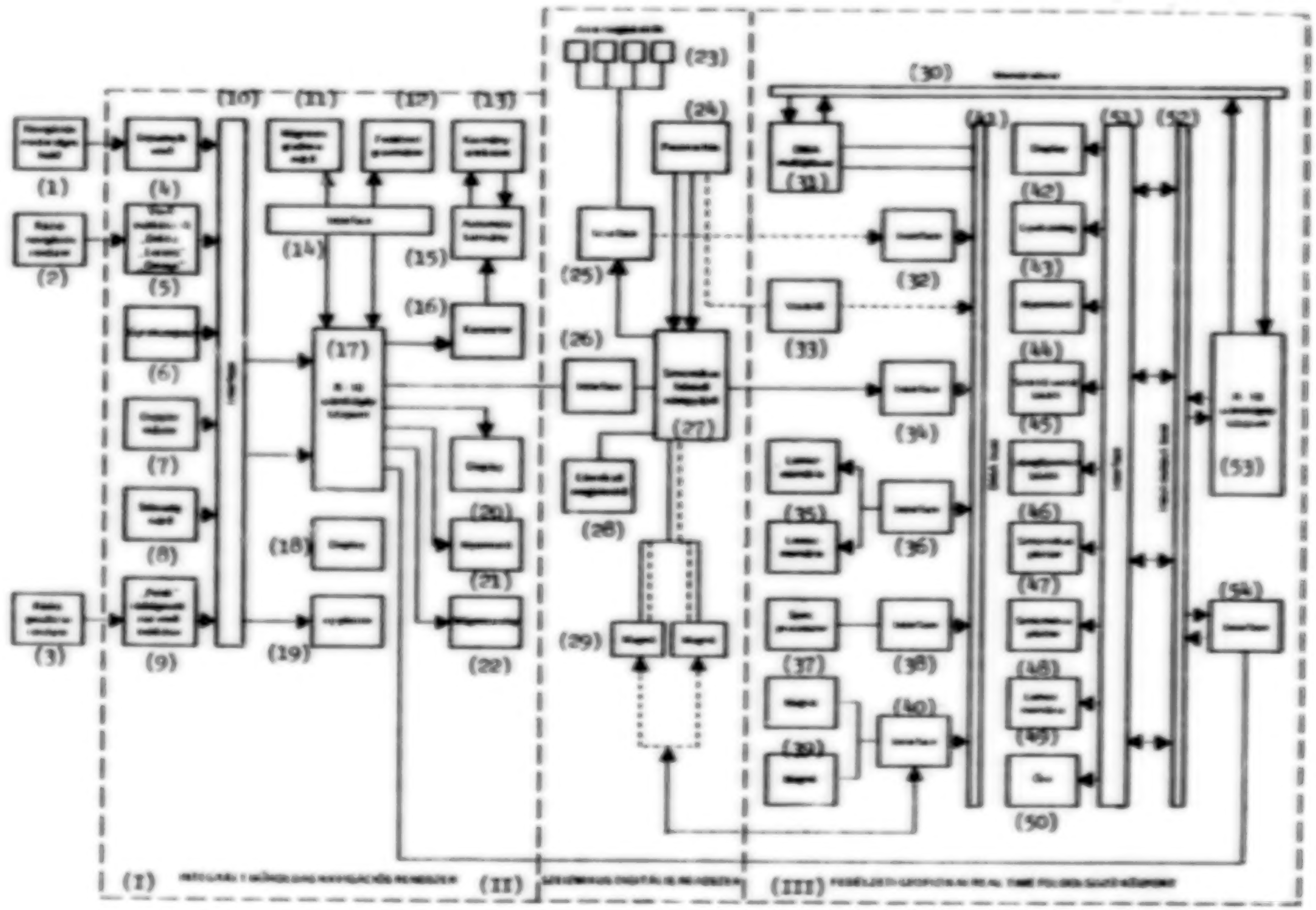

Figure 1. Block diagram of the MARS real-time on-board geophysical pre-processing center.

[Key on following page]

Key:

I. Integrated artificial satellite navigation system.
II. Seismic digital system.
III. On-board geophysical real-time processing center.
1. Navigation artificial satellite
2. Radio navigation system
3. Radio geodesy system
4. Sputnik receiver
5. Receiver indicators: Dekka, Loranc, Omega
6. Gyrocompass
7. Doppler instrument
8. Speed measurement
9. "Poisk" radio geodesy receiver-indicator
10. Interface
11. Magnetic gradient meter
12. On-board gravimeter
13. Rudder assembly
14. Interface
15. Automatic ruder
16. Converter
17. R-10 computer center
18. Display
19. x-y plotter
20. Display
21. Printer
22. Magnetic tape
23. Aero oscillators
24. Piezo conversion
25. Interface
26. Interface
27. Seismic receiver data collection
28. Control display
29. Tape recorders
30. Memory bus
31. DMA multiplexer
32. Interface
33. Control
34. Interface
35. Disk memories
36. Interface
37. Special processor
38. Interface
39. Tape recorders
40. Interface
41. DMA bus
42. Display
43. Punch tape
44. Printer
45. Multiplication-division block
46. Floating decimal block
47. Seismic plotter
48. Seismic plotter
49. Disk memory
50. Clock
51. Interface
52. Input-output bus
53. R-10 computer center
54. Interface

The most frequently used algorithms of the special processor are the following:

--calculation of the arithmetic mean,
--putting in dynamic corrections, according to the given speed function,
--transformation from floating decimal to fixed decimal,
--carrying out convolution with discrete functions,
--carrying out recursive filtering,
--transmitting blocks of data,
--scaling.

Demultiplexing takes place simultaneously with format transformation of the data provided by the seismic receiving instrument into a floating decimal 4 byte form, and the data go by continuous channel to disk memory.

The special color plotter used to display the data processed by computer technology also merits mention; it could be introduced in other areas of computer technology also (Figure 2). This seismic plotter is of the drum type and writes

on normal paper, eliminating the development procedures for optical plotters. The vibrating tongue of the plotter gives a digital rendering at a frequency of 5 kHz in points 0.15 x 0.1 mm. It carries out autonomous profile write-out with the aid of its own internal 3 Kbyte memory. The write-out modes correspond to the norms generally used in seismic apparatus writing (changing area, wave writing and combinative forms). The precision of writing is 0.1 mm. The seismic plotter can also be used as a color plotter, in the multi-head version. It is useful to use this primarily in the delayed pre-processing mode when the ship is not making profiles, because of storms or because it is in port, and it is possible to study the profiles in more detail. Color representation embraces a large dynamic range, for example 12 dB per color, which cannot be handled in a black and white seismic visual rendering. The colors show amplitude or frequency relationships, providing significant extra information for interpreting the profiles.

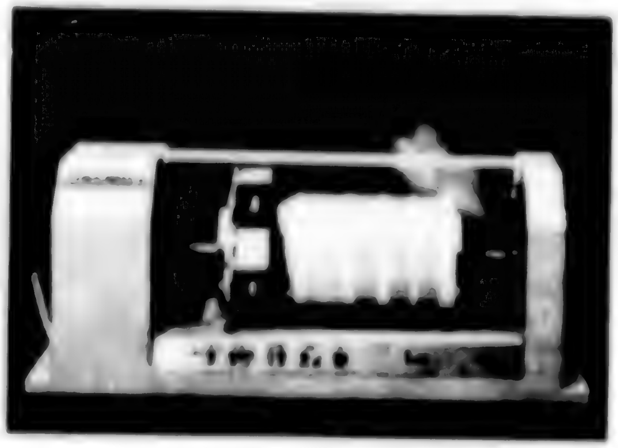

Figure 2. The color plotter.

The Software System for Ocean Research and Its Performance

The real-time presentation program package for time profiles contains the more important operations shown in Figure 3. In general the real-time data collection and processing shown require 20 seconds. The interval for sampling incoming data is 2-4 ms. Express profile editing can take place with a presentation of all channels or individual selected channels (Figure 4).

The program system prepares a protocol on a fast printer concerning all parameters of measurement and processing, changes therein and errors or other events. A monitor serves the geophysical system itself, instrument by instrument, the daily productivity of which, for example in 12-fold summation operation, can reach 200 kilometers. The technical-economic indexes of the MARS system correspond to those of a few similar systems used around the world (for example, Holis-Hedberg and Gulfrex).

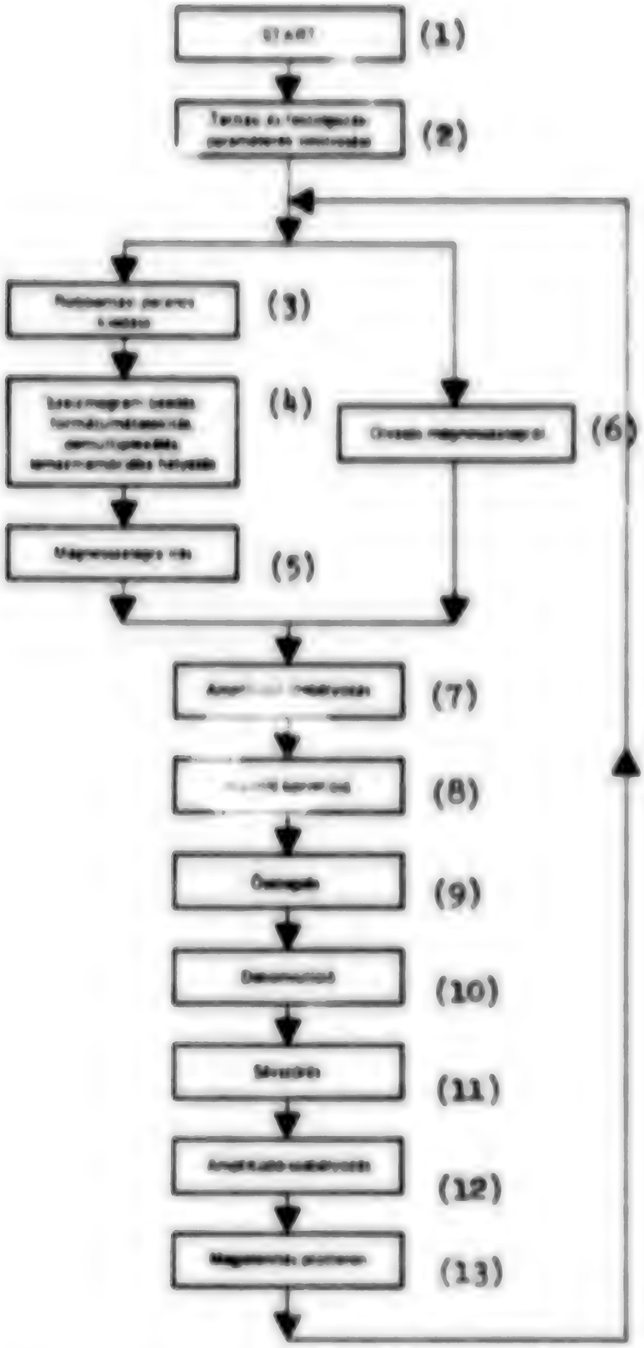

Figure 3. Flow chart of the real-time maritime pre-processing system.

Key:

1. Start
2. Read-in of conversion and processing parameters
3. Issue of explosion command
4. Seismogram in-put, format transformation, demultiplexing, disk memory in-put

[Key continued on following page]

5. Writing on magnetic tape
6. Reading from magnetic tape
7. Amplitude control
8. Normal correction
9. Summation
10. Deconvolution
11. Band filter
12. Amplitude control
13. Display on plotter

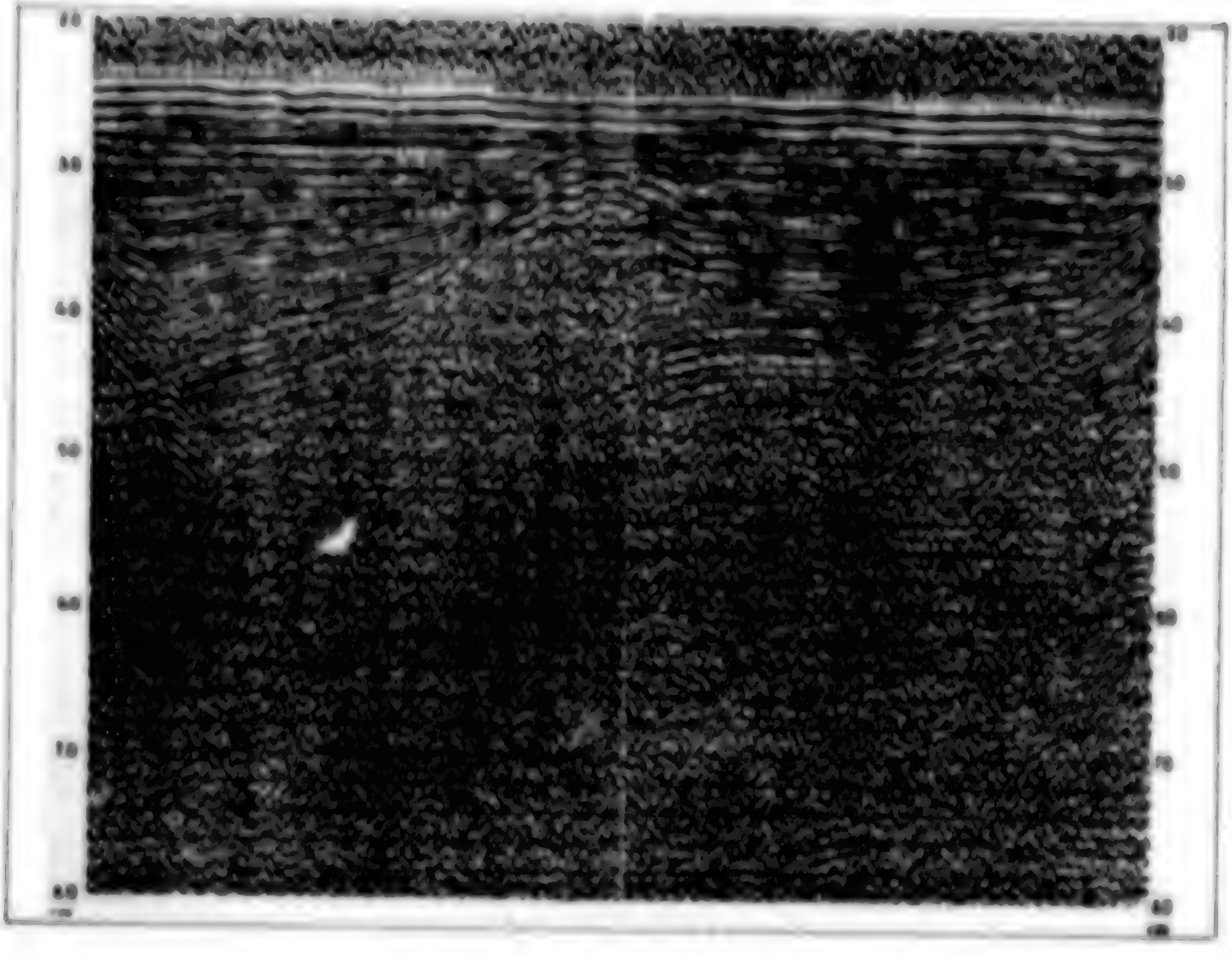

Figure 4.

In cooperation with the Oceanological Institute of the Scientific Academy of the Soviet Union the system for ocean raw materials research has also been used in other areas of interest to scientific oceanography. In addition to geophysical measurements the oceanographic programs measure and process about 50 hydrodynamic, meteorological, water pollution, radioactive, acoustic, etc. parameters. Another R-10 computer became necessary to service this extended detector network. The linking of the processors and optimization of data processing among the several computers became absolutely necessary in this version.

Further Development of the MARS System

On the basis of the success of and experiences with the first generation of the real-time pre-processing system family the institutes participating in the program have made preparations for a new generation, the base computers of which will be the R-11 computers of Videoton. The R-11 has a number of properties which will be advantageous for performing ocean research tasks; for example, DMA, a larger memory, micro-programmed peripheral interfaces and increased capacity disk memories. At the same time we shift to the new computers we will modernize the peripherals and special geophysical instruments so that the entire system can meet the increased geophysical requirements of ocean research.

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CSO: 2502

INTERKOSMOS-21, HUNGARIAN INSTRUMENTATION, PARTICIPATION

Budapest NEPSZABADSAG in Hungarian 25 Feb 81 p 6

[Text] Although IK-21 [Interkosmos-21] which was launched on 6 February is only an experiment for establishing a large-scale data-collecting system (hydrological, terrestial magnetic data), it is especially important to Hungary for two reasons: no other IK satellite has contained so much Hungarian designed and fabricated equipment, and Hungary is the center for the technical monitoring of the entire system.

The work is done by a group of 24 persons who comprise the astronautical research group of the Department of Microwave Communication of Budapest Technical University under department head, Dr Lajos Pasztornicky. The work is supported by the Interkosmos Council of the Hungarian Academy of Sciences. The university department, in collaboration with industrial partners, has undertaken a lion's share in the instrumentation of IK-21. Its signals are monitored at the department every one-and-a-half hours.

In the past, Hungary has provided feed units for the telemetric systems of IK satellites. The voltage of the batteries which are charged by solar panels fluctuates. However, the instruments require constant voltage, and the Hungarian feed unit stabilizes this to a precision of one percent within the desired value. The units are 90 percent efficient and has been used on all joint satellites since 1976.

With the launching of IK-20, the predecessor of the current satellite, Hungary provided not only the feed unit but other equipment, and the computer system used to monitor instrument functioning was also developed at the University. The system was used during satellite assembly, before launch, and operates now during flight. It monitors not only the satellite but the entire SSPI system, the operation of which is coordinated by the GDR. SSPI are the initial letters of Russian words which mean System for Data Collection and Transmission. The system, which is still experimental, serves to collect data by radio from automated metering places located in various parts of the world and then transmitting it to earth. In the system, a single satellite can collect data from a maximum of 16 collection sites. Instruments at such sites are called buoys regardless of whether they are located on land or sea. At present, IK-21 is collecting data from fewer than 16 buoys. They are located in the GDR, the USSR, on land, on oceanographic research vessels and at the quarters of the astronautical research group of Budapest Technical University.

When a satellite flies over a buoy, it sends an ultra short wave radio signal to the buoy asking it to transmit the data it has collected and stored over the past 24 hours. The initial buoy response is a standard signal. If the satellite judges that transmission conditions are favorable, it signals the buoy again to begin transmitting data. A transmission lasts 18 seconds, at a rate of 680 bits per second. The rate is slow in order to conserve energy; should the actual buoy be located at the North Pole or in mid-ocean, such conservation would be vital.

The satellite, like its predecessors, rotates at an altitude of 500 kilometers. Thus it reaches a position to transmit data to Hungary every 90 minutes during most of the day. At such times it transmits at a rate of 7,000 bits per second. The data is tape recorded and evaluated for quality of transmission and number of errors in barely 5 minutes by a computer program also developed at the university. This information is then forwarded to the GDR coordinating center.

Though data from the satellite can be received by the other socialist countries, Hungarian receivers are specialized to evaluate, to monitor how the equipment is functioning technically. According to Dr Tamas Hetenyi, a member of the special group, "Our microcomputer, microprocessor system could determine, even during assembly, whether all components were functioning and whether the satellite was transmitting the data received. Of course, this was merely a test program, just as the buoy here transmits experimental rather than actual metering data."

Using products made by the Budapest Radio Engineering Factory [Budapesti Radiotechnikai Gyar] and the Gamma Works [Gamma Muvek], the following components of the system were developed by the astronautical research group of the department: on-board radio transmitters to maintain contact between satellite buoys as well as satellite and ground stations, on-board feed unit, receiver components and receiving-transmitting combining filters. The antennas of the buoys, their radio transmitters, receiver components and the feed units were also developed by the university.

Researchers are proudest of their computer system which not only operates the local control station but can monitor the dialogue between any buoy and the satellite. Furthermore, it can monitor and check connections between the satellite and ground stations, but on a different wave length. The GDR colleagues use this same microprocessor system to check the satellite from earth.

Says a spokesman for the group: "The IK-21 is the most complex Interkosmos satellite to date. We are proud to have been able to make so great a contribution to its preparation, operation and to the evolution of the SSPI system which currently collects geomagnetic data but can be used for many other purposes in the future."

Says Gabor Pal Peto [writer of this article]: "I leave the astronautical research group with a feeling that I could have included it in my series, 'Hungarian Science Workshops.' It is an independent scientific unit which has won esteem for itself in the space research collaboration of the socialist countries."

CSO: 2502

ACHIEVEMENTS OF ELECTRONICS INDUSTRY

Sofia BULGARIA TODAY in English No 2, 1981 pp 6, 7

[Article by Dimo Velev]

[Text] Electronics, until recently a concept whose meaning few people knew, is now part and parcel of contemporary life, having entered it rapidly, powerfully and lastingly. The techno-scientific revolution, of which we are contemporaries, brought us a great deal of this in innumerable ways, but in spite of this the 20th century will most probably go down in history as the century of electronics.

Bulgaria lives the full-fledged life of this century, because in the rates of electronisation even of agriculture she can vie with the most advanced countries. But what characterizes Bulgaria now is that she is among the biggest producers of electronic computers in the world. She holds the sixth place in the world's list of producers and exporters of computer equipment.

Let us not look back to the past when twenty or thirty years ago the Bulgarian people were starting almost from scratch. The development of electronics two or three decades ago was unthinkable. Today we have a Ministry of Electronics and Electrical Engineering which is in charge of 130 enterprises, research institutes and development and pilot centres. Let us consider this fact only in one aspect: the enormous efforts that had to be put into training specialists for this new branch.

The attention which the Bulgarian state pays to the development of electronics can be seen best from the following fact: the annual average development rates of this progressive branch have long been twice as high as the average ones for Bulgaria's industry as a whole, although it is developing also at rapid rates. In the recently ended Seventh Five-Year Period, the plan of which was fulfilled, electronic and electrical engineering output increased at an average annual rate of 12.8 per cent and at the end of 1980 it had increased 1.8-fold in comparison with 1975.

Electronics is an industrial branch which, like many other industrial branches in Bulgaria, could not develop outside the international economic cooperation between the socialist countries. Specialization within this framework has made it possible for Bulgaria to be the chief producer in the socialist community of memory devices, magnetic discs and magnetic disc packs and one of the greatest producers of magnetic tape memory devices.

During the Seventh Five-Year Period Bulgaria jointly with the USSR worked upon 78 groups of articles. This was instrumental in determining the structure of trade between the two countries in this sphere. New forms of integration have been introduced and are being utilized - joint Bulgaro-Soviet organizations have been set up for designing and constructing complete projects, joint firms, research and production enterprises and institutes. The Interprogramme Institute, for instance, elaborates programmes for automated systems of management. Bulgarian electronic apparatuses on board Soviet space rockets were launched and worked in space. Cooperation within the CMEA makes it possible for Bulgaria to introduce 400 new or updated articles every year.

Bulgaria's contribution in this field is of world significance but the problems to be solved in electronics are so complicated and diverse that it would be impossible to count only on the country's own resources for the effective development of electronics.

Specialization within the framework of the CMEA, which ensures markets in the socialist countries, has made electronics and electrical

engineering into a structure-determining branch of Bulgaria's economy. Half the exports to the socialist countries are bound up with agreements on specialisation and cooperation. This makes it possible to develop big series production and stable trade relations. The vast Soviet market has played a key role in the development of this youngest branch of Bulgaria's industry. During the Seventh Five-Year Period the volume of the exports of electronic computers to the USSR accounted for 25 per cent of the entire export from Bulgaria to the Soviet Union.

The high and stable development rates, the use of modern machinery and equipment and the application of progressive technologies ensure the high quality of Bulgaria's electronic products which are in demand on the market abroad. Seven years ago the whole export of electronic equipment consisted of only 300 electronic calculators. Only five years later the number had grown to 15,000 and 80 per cent of this output was exported to Great Britain, France, Belgium and other industrially developed capitalist countries.

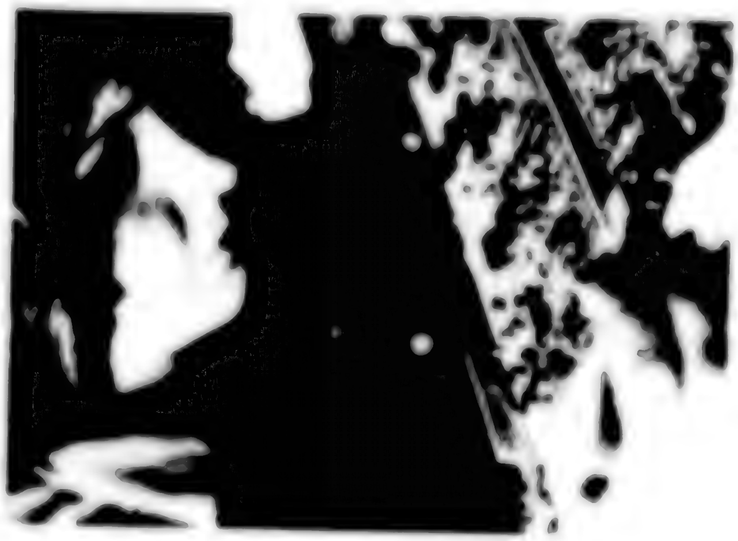
Bulgaria's export list is constantly growing. The structure of the export is also being continually improved by increasing the percentage of complex deliveries which are in demand in more than 80 countries in Europe, Asia, Africa and America. 18 per cent of the country's export goods are produced by the electronic and electrical engineering industries.

Electronics is a key factor in the country's techno-scientific progress and in raising the effectiveness of the economy. For three years now Bulgaria has been fulfilling her national complex programme for electronisation, the final goal of which is to raise labour efficiency very rapidly in the key branches of the national economy. Electronic means of automation of in-discrete processes have been introduced, the necessary technological and programme means of automation of discrete flow-lines, machine tools, automated warehouses, complete automated flow-lines, etc., are being prepared. Electronic systems of management and monitoring of farm machinery are also being developed in Bulgaria. Electronics promotes the development of industrial branches with the application of sophisticated, effective, and highly productive technology.

Microelectronics in this country will develop at priority rates. The progressively growing miniaturization of microelectronic circuits at low cost results in greater calculating capacity. This revolutionizes the working out and production of electronic and electronization equipment, and expands the range and the effect of electronization. That is why we are endeavouring to reach top achievements in microelectronics, to master the new technologies for the production of microelectronic elements with higher technical and economic parameters, to rank among the leading producers of microelectronic articles. The trends in the development of Bulgarian electronics show that in the near future the average density of the elements in Bulgarian micro-circuits will surpass the highest world indices.

Electronics tomorrow, that is the process of mastering what are secrets today. Having gathered strength, Bulgaria is ready to join in furthering this process and has even the ambition to be among the leaders.

At the automated process line manufactured by the Beroe Robot Plant in Stara Zagora



At the Elektra Plant in Sofia

CSO: 2020

REPORT ON DEVELOPMENT OF ROBOTS

Sofia BULGARIA TODAY in English No 2, 1981 pp 7-14

[Article by Georgi Vassilev]

[Text]

Whoever wants to find the origin of the word 'robot' should go back exactly 60 years, when, in his play R.U.R. the famous Czech author Karel Capek gave his mechanical people this name: 'rob' (= slave) of man, undertaking his tasks. Over the years the term 'robot' has been gaining ever wider use in our lives – to recall science-fiction films and books in which he, the robot, travels to distant planets, plunges into the depths of the oceans and even on occasions rises against his all-powerful masters.

Every fantastic idea or plan is a kind of a 'reconnaissance' into the future. The first real representatives of the so-called 'mechanical men' are already far back in the past and their first achievements arouse smiles even in the layman. Today 'robotics' is a worthy branch of science and industry, one peculiar co-existence of man's intellectual capacities and the power of modern technology which opens up endless prospects.

The Bulgarian scientific and technological mind quickly latched on to this prospective field. The development of robotics became one of the strategic trends of scientific and technological progress. Favourable conditions were created for making it a sphere of industry practically influencing now and in the future mechanical engineering, metallurgy, construction, transport etc.

The creative thought of scholars and specialists provided conditions for the rapid introduction of scientific research and developments into practice. The Beroe Robotics Research and Production Combine in Stara Zagora already produces corbel, gantry and standing robots with rigid controls of the 'Pirin' family with 1-4 arms, transfer and other transport and storage systems and lines according to original Bulgarian designs and with a high level of unification. Industrial robots of the 'Beroe' family with cylindrical, spherical and anthropomorphous co-ordinates are being launched into production. The production of robots for painting and varnishing designed by leading world firms will shortly begin. The Stara Zagora Combine is a comprehensive supplier to the USSR, Czechoslovakia, Poland, the GDR and other countries, while our country has been

designated as the co-ordinator in the development and introduction of robots in the CMEA member-countries.

The achievements of robotics, its successful appearance on the foreign market with its competitive products were the starting point for our interview at the Institute of Technological Cybernetics and Robotics which is part of the Bulgarian Academy of Sciences in Sofia, one of the groups called upon to become leading in the present and especially the future of this branch which can already safely be called a branch of industry. The interview, which was devoted to the Institute's work and its new trends and prospects, was taken from its director Senior Research Associate engineer Angel Angelov, First Deputy President of the Committee for Science and Technological Progress, and Senior Research Associate engineer Nedko Shivarov, Head of the Industrial Robots section.

Eng. Angelov: 'We have taken up certain applied scientific tasks which will supply our robotics with new products. We have handed over for production a micro-processing control system for industrial robots of the RB-230 family which was elaborated here. This novelty is on a high technological level and is being put into production in exceptionally short terms'.

Eng. Shivarov: 'The RB-230 family of industrial robots includes four basic models. They create possibilities for lifting and positioning of parts weighing between 15 and 1500 kg. A major part of the problems of the robotization of industrial processes can be solved with these universal industrial robots.

We are at present working on plans for a new 'conveyor belt-machine-robot' system. The RB-232 robot, controlled by our microprocessor system, is included in it. One of the first applications of the system will be in the ceramics industry. It will replace human labour in the packing of finished products. A special automation system will give the empty crates to the robot and take the crates full of glazed tiles. Another special electronic-eye system will sort the boxes of glazed tiles arriving on the conveyor belt and will order the robot in which crate to pack the finished product.'

Eng. Angelov: 'Another elaboration which has had concrete practical results is the industrial robot for arc-welding in an enclosed gas medium – one of the industrial operations most dangerous to man. In it the worker is exposed to glaring light, splashes of hot metal, harmful gases and irradiation. The establishment of series in the arc-welding of parts, especially in closed spaces, is a serious technological problem. On the other hand, arc-welding is an indispensable technical process. In order to realize this original elaboration the Institute is working in close liaison with Paton, the world-renowned Soviet Institute of Electric Welding. A robot for welding was on display last year at the International Trade Fair in Plovdiv.

Besides applied scientific projects, the Institute's research associates also work on themes of pure science in connection with the future of robotics.

Eng. Shivarov: 'Within the framework of the subject 'Principles for the Construction of Industrial Robots with Adaptive Behaviour', various theoretical and applied scientific aspects of the next generation of robots-adaptive robots, are being worked out. Today's robots are blind, dumb and deaf. They accurately undertake the programme fed into them by man. In order that tomorrow's robots might function adaptively (adjust themselves to their surroundings), we are working out certain new elements and principles of their programme back-up. Various types of sensory elements are being created. Dactylic sensory elements will allow the robot to 'feel' touched objects, television sensory elements and systems will give it 'sight'. Other devices will enable it to 'sense' its approach towards a given object as well as its passing it etc. Our associates who have devoted themselves to robotics are deeply involved in such questions.'

Eng. Angelov: 'Industrial robots release man from working in a harmful or unusual environment and from monotonous or heavy tasks.

They are tireless 'workers' who are not afraid of dirt, noise or vibration, lift heavy weights with ease and can work around the clock. A well-planned robotized system can attain the optimal operational time of the robot and machines, and hence also raise the productivity of labour.'

Robotics requires a solid scientific foundation and its products are highly valued on the international market. Within the framework of the international division of labour it is possible to export entire systems which, apart from industrial robots, also include machinery and the remaining technological accessories. First steps have already been made in this direction. Bulgarian manipulators were well received in many of the CMEA member-countries. The question of accelerated introduction of the already prepared prototypes of industrial robots and the elements and assemblies for them is now facing workers in the field of robotics. Thus robotics will in coming years become a highly efficient sub-branch of our industry with great prospective significance for the Bulgarian economy.

A mere six decades after the first appearance of the name of the 'Mechanical man' – the robot – in literature, the world is already accustomed to treating its labour as something real and existing, and to projecting it into the future. Robots, born of the mind and technological genius of man, are now his good helpers and collaborators in the scientific and technological revolution of our day.

Another robot with a Bulgarian trademark

CSO: 2020

CURRENT STATE, DEVELOPMENT OF COMPUTER TECHNOLOGY

Sofia RADIO, TELEVIZIYA, ELEKTRONIKA in Bulgarian No 12, 1980, pp 2-4

[Article by Senior Scientific Associate First Class Candidate of Technical Sciences Engineer Zh. Zhelezov, director of the Computer Equipment Institute and chief designer of the unified computer system and small computers system in the Bulgarian People's Republic: "State and Development of Computers in the Bulgarian People's Republic"]

[Text] In the past few years the question of the extensive use of computers in the various sectors of the national economy has assumed ever greater significance in terms of improving the production structure. The successful solution of this problem greatly depends on the implementation of the party's tremendous task of insuring the comprehensive intellectualization of labor.

The developers and production workers within the IZOT DSO [State Economic Trust] are continuously working on the development of a great variety of technical means needed for the application of electronics in the various areas of our national economy. New computers have either been installed or will be installed before the end of the year. This will enable us, in the very first years of the next five-year plan, to initiate a qualitatively new stage in the utilization of computers. A characteristic feature of the new stage will be the mass use of computers in the overall operative management of various industrial, technological and managerial processes. This means that whereas so far the main role of the computers was fast data processing and the solution of individual even though complex problems, in the future it will become a direct participant in the management cycle. This is the main prerequisite for the intellectualization of the described processes.

One of the basic requirements of computers in the new stage of application is to increase the computing speed. This problem is largely resolved by the new computer model--the ES 1035.

The ES 1035 system is based on the central ES 2635 processor which is its nucleus and which determines its most important characteristics: high output (higher by a factor of almost 14 compared with the productivity of the ES 1020 and triple the productivity of the ES 1022 B) and the possibility to work with a virtual memory, i.e., with a maximum amount of memory per ES EIM of 16 megabytes, regardless of the fact that the actual physical volume of the memory system does not exceed 1 megabyte.

The problem of upgrading the productivity of computers is one of the most topical in the development of computer equipment. The inclusion of the specialized processor for matrix computations (SPMI) in the data processing system offers a satisfactory solution to this problem for a certain range of tasks.

The ES 2335 matrix processor, developed in Bulgaria, operates as a peripheral processor which provides the high speed processing of data submitted in the sectorial or matrix aspect, on a parallel and independent basis of the work of the central processor. The logical inclusion of the SPMI in the system is achieved through the facilities of the input/output system. The SPMI combines the functions of the input/output channel, the control system and the external system.

The operation of the specialized processing computer system may be described as the interaction of the following hierarchical levels: consumer programs, basic program support, method of access to the matrix processor (MDMP), central processor, and matrix processor.

The range of problems whose solution with the help of the SPMI would considerably reduce computer time includes the processing of high-volume matrixes which are the reason for time losses in the programming of problems related to geology, seismology, meteorology, military affairs, linear programming, mathematical analysis and others. It is estimated that for this group of problems processing time may be reduced by a factor ranging from 10 to 100 depending on a number of factors such as the matrix volume, matrix operations used, means of organization of consumer programs and, correspondingly, of the SPMI channel program and so on.

The IZOT DSO pays particular attention to the operative servicing and utilization of computer capacity by the largest possible number of consumers. The creation of the ESTEL remote control data processing system was an effective measure in this respect. The system uses apparatus and programming facilities developed through the joint efforts of CEMA-member countries in the field of computers. The name ESTEL is a trademark of the IZOT DSO and shows the affiliation of technical and program facilities with the unified computer system (ES EIM). Some of the technical facilities are for general purposes and their variants are used in the creation of similar systems with small computers within the Small Computers System (SM EIM).

Many consumers in the socialist countries are familiar and satisfied with the teleprocessing ESTEL-1 and ESTEL-2 systems. Experiments with these systems were conducted over a period of several years under factual operational conditions and they are already being used for various purposes in the USSR, Czechoslovakia, Hungary and, naturally, Bulgaria.

The ESTEL-4 system is the next step in the development of the sequence of ESTEL systems. It includes new concepts and additions based on global experience in this area and on the results achieved so far by the users of the older models.

The IZOT DSO has already developed traditions in the development and production of external memory systems. The series production of the first system of replaceable ES 5052 magnetic discs with a 7.25 megabyte capacity was developed in 1970 and undertaken in 1971. Also at that time several modifications of this memory system were produced as well as the ZUMD ES 5061, with a 29 megabyte capacity, the minisystems ZUMD IZOT 1370 and ZUMD ES 5074 and the SM 5400.

This year international tests were conducted and a number of modifications will be made to the following systems: the ZUMD with a 12 megabyte capacity for the SM EIM; ZUMD type ES 5061 for SM EIM; and mini-ZUMD ES 5088.

A major step in the development of the ZUMD in Bulgaria was taken with the development of the ES 5067-02 with a capacity of 2 x 100 megabytes and ES 5067 with a 200 megabyte capacity. These memory systems combine new technologies and new principles for work with a large volume of information and high data transmission system, low access time, high reliability and convenient use. The ES 5067-02 and ES 5067 memory systems will be applied in the ES EIM (RYAD-2) and, following their modification, in the SM EIM.

Our country is specializing in the production of both large and small ZUMD.

The characteristic feature of the large ZUMD is the fact that their development involves two basic designs: the ES 5012 and the ES 5003.

The first basic design ES 5012 is lighter and less expensive. However, it does not provide automatic charging and is to be used above all for the RYAD-1.

The ZUML-ES 5612 is the highest model based on the ES 5012 design. It operates at a speed of 3 m/s and the recording method FK/BVN-1. The other ZUML, created on the basis of this design, are the ES 5012-03, with a speed of 3 m/s and a recording method BVN-1 and the ES 5012.01 with a speed of 2 m/s and a recording method BVN-1.

The second basic design, the ES 5003, is to be used both in RYAD-2 and RYAD-1. It offers several important advantages: automatic ribbon loading, possibility for high speed--5 m/s, and low rewinding time--45 seconds--the use of a cassette with a protective ring, a vacuum single roller, ribbon motion based exclusively on air pillows, a hard lining magnetic head, and others. The highest level reached by ZUML on the basis of the ES 5003 design is the ES 5003 system with a speed of motion of 5 m/s, printout FK/BVN-1 method and multiplex diagnostic interface. The ES 5003 design was used for the development of the ZUML ES 5003.03 with a 3 m/s speed, FK/BVN-1 printout and modified interface for work with UU ES 5525.03 with which it has been successfully connected.

Two designs have been developed in the area of the small ZUML: with a 216 mm roller diameter and 267 mm roller diameter. The first design was used for the development of the ZUML IZOT 5003 and IZOT 5004 (SM 5300) with a 0.32 m/s speed; the second was used as a base for the IZOT 5005 (SM 5302) with a 0.63 m/s speed and the IZOT 5006 with a 1.14 m/s speed.

Available information indicates that the long argument on the advantages of paper or magnetic memory systems in the preparation of data for central computers is nearing its end. While "yesterday's" predictions were not justified, today's facts have convinced even the most zealous supporters of equipment based on punched cards and ribbons of the substantial advantages offered by magnetic areas and respective data preparation systems.

Bulgarian achievements in the area of memory systems with replaceable magnetic discs constitute a solid foundation for the fast and successful solution of a number of problems related to the designing and production of systems for the preparation of data for magnetic memory systems.

The UPDML 9004 [System for the Preparation of Data for Magnetic Memory Systems] is a major functional, organizational and structural step forward. The flexible design of the product enables the consumer selectively to use a broad range of keyboards, a block ELT indicator and perform additional functions such as linking magnetic tapes, output of punched cards and printouts, input from reading systems on punched tape and cards, exchange of data along communications lines, and others.

The SM 6901 and the ES 9112.01 systems for floppy disc data recording and the ES 9113 rerecording system from a floppy disc to a magnetic tape are the first three systems in the set of equipment for data recording on floppy discs. The features of these systems--programming based on a microprocessor system, VZU with direct access, long-range information carrier, modular design, and others, account for their high technical standard.

A billing-bookkeeping machine (office computer), IZOT 0250, has been developed on the basis of the microprocessor 606 series. It is used for the gathering and initial processing of economic data and the printing of documents. In the course of the designing of the IZOT 0250 the specifications for such systems were refined, such as, for example, high reliability, high volume of operative memory, connection with external memory systems and others. The system includes a 12 kbyte operative memory, and two ZUGMD, the ES 5074 and the ATsPU 7187. Technically, the possibilities of microprocessor circuits have been maximally used in the development of the IZOT 0250. All control functions of the external systems are performed by a processor, for the speed is small and the external systems are relatively slow. This offers the possibility for the use of controllers with a minimum number of systems.

One of the most promising areas in the utilization of microprocessors is the processing of textual information. The automation of traditional editorial activities with a suitable price and systems productivity is a firm foundation for the total mechanization of the work of typing offices, editorial rooms, printing press combines, and others.

Thanks to its extensive functional possibilities the IZOT 1002 S enables the operator to focus his entire attention on the creation and processing of the text. This increases labor productivity in one of the most difficult areas of office equipment several hundred percent.

Another area in which microprocessors are successfully used is that of the development of access control systems. They offer the possibility of effectively controlling enterprise personnel attendance. Systems of various types are being produced, ranging from systems for small enterprises employing about 300 to 500 people to systems for organizations employing over 4,000 people.

The control is based on individual identification cards with an optical readout, punched cards or magnetic cards. The external memory systems most frequently used are cassettes of the ZUMD or ZUML type.

The access systems make it possible to practice a flexible working time with the parameters desired by the system user. Such systems may be used in the organization of the access work system in laboratories, computer rooms and other restricted access premises.

Many of the systems offer possibilities for the primary processing of data coming from the control panel and for accounting-bookkeeping payroll operations.

In order to resolve this problem the IZOT 1001 S access system was developed in Bulgaria.

In order to insure the rapid application of the intellectualization process in industrial and technological operations, one of the major requirements of computers is their inclusion within the overall management cycle. In order to meet this requirement rapidly and extensively, the Computers Institute is working on problem-oriented sets.

The problem-oriented set (POK) is a system consisting of one or several computers with a full set of basic and program support and an organizational application system, based on the problem being resolved in a specific area. Since the specific applications of a single POK may vary, the tendency is to develop as standard the most frequently encountered one. Essentially, the POK may be considered as part of an automated control system.

The first step in this new direction is the elaboration and application of so-called program-technical sets (PTK). They represent systems of technical and programming facilities for specific purposes. However, in this case the set of applied programs is incomplete to one or another extent and there is no organizational application system.

Examples of PTK are the ES 9003 multiple-panel data input system and the system for processing financial-bookkeeping data with the IZOT 0250 office computer. Both are being produced serially. Development of applied program support through them may lead to a POK, as was the case with the application of ES 9003 in automotive transportation.

The development of computer facilities calls for the continuing updating and redesigning of production capacities. This applies, above all, to the use of modern technological equipment and measurement and printing instruments, and the replacement of general-purpose equipment with specialized highly productive machine units with digital or microcomputer control. Computers play a major role in the automation of the processes of commodity tuning, testing and final control and in the development of industrial robots. This is a basic guarantee for upgrading the reliability of all items.

We can proudly state that Bulgarian computers have achieved considerable successes. They are the result of the wise and confidently pursued April line by the BCP. Without the firm decision of our party on the development of computer equipment and without its all-round aid, assistance, and control, today's successes would not have been possible.

We must not forget, however, that these successes were made possible thanks to bilateral and multilateral integration and production specialization and cooperation among CEMA-member countries. Under socialist conditions, these processes are a powerful factor in scientific and technical progress.

5003
CSO: 2202

SPECIFICATIONS OF IZOT 250 COMPUTER

Sofia RADIO, TELEVIZIYA, ELEKTRONIKA in Bulgarian No 12, 1980, inside of front cover

[Text] Computer Izot 250

The Izot 250 office computer is a modern means for economic data processing. It has high technical-economic indicators and operates at high speed. The Izot 250 office computer is based on highly integrated MOS circuits. The use of a memory system on flexible magnetic discs (floppy discs) makes the secondary processing of the data by a small or large computer possible.

Technical Characteristics

Guiding system: operative memory--12 K; permanent memory--18 K; 512 independent digital registers, 256 text registers, and 10 registers for constants;

Mathematical operations: adding, subtracting, multiplying, dividing, percentage rates; word length: 16 bits.

Display:

Digital--for feeding data and intermediary results; office--on the condition of the system.

Keyboard:

Letters-numbers (Latin, Cyrillic); service; digital.

Printing system:

Speed, 30 symbols per second; 156 symbols per line; paper width, 380 mm; tabulation; changeable printing disc; handles punched cards and forms.

Floppy disc memory system: 250 K per disc; 77 lines.

Feeding power: 220 volts, 50 Hz.

Programming: Use of specialized problem-oriented input language (easily learned with minimal programming knowledge), through built-in translator.

Exporter: Izotimpeks VTO [Foreign Trade Trust], 51 Chapaev St, Sofia, Bulgaria. Telephone no 73-61; telex; 022731; 022732.

5003
CSO: 2202

ELECTRONIC PRODUCTS SHOWN AT PLOVDIV FAIR

Sofia RADIO, TELEVIZIYA, ELEKTRONIKA in Bulgarian No 12, 1980, pp 6-7

[Report: "Bulgarian Electronics at the 36th International Fair in Plovdiv"]

[Text] The participation of the Bulgarian electronics industry in the 36th international fair in Plovdiv, held on the eve of the 1,300th anniversary of the founding of the Bulgarian state, is manifested in the mass display of systems for the control of different processes and human activities. It is truly inconceivable for a person to avoid the direct involvement in a given process and in many activities related to its management without the use of modern complex technical facilities and systems. Most of the exhibits are automation systems, and mock-ups of complete projects and of technological equipment. A far lesser number of electronic and electrical engineering instruments and apparatus are exhibited and there are extremely few exhibits of elements. There is a modest display of household radioelectronic and electrical engineering equipment (Pavilion No 16a).

Exhibits of Bulgarian electronic goods clearly emphasize the trend of converting from the production of individual items to the development of systems and complete projects which summarize the achievements of our specialists in the elaboration and development of integral sets of technical and programming facilities.

It is no accident that 9 of the 11 gold medals awarded in this year's Plovdiv International Fair in the areas of electronics and electrical engineering were for data automation, gathering and processing systems, as follows:

1. System for engineering labor automation (SAIT). This represents one of the greatest achievements of our computer technology. The system is of exceptional interest to engineers and designers in the fields of electronics, construction, textile industry, architecture, machine building and others. For example, in the electronic industry this system is used for the designing of printed circuits, integral circuits, and others within an interrelated system. It is a typical representative of interacting systems with a graphic subsystem which includes a display processor, graphic display and light pencil.

2. A warehousing system based on IZOT 1003 S. This is a specialized microprocessor modular system based on the SM 600 microprocessor system. It is used in the mechanization and automation of bookkeeping and planning-accountability data, payroll computations, and others. It is applicable in warehousing and commercial bases for keeping inventory records, the study and analysis of consumer demand and others.

Outgoing information may be recorded on discs and the connection with a computer or minicomputer makes it possible to use the system as a terminal in the development of large information systems.

3. The problem-oriented INFOREG set. This is a referential-information and recording system based on the SM 4 minicomputers. It is a powerful multiple-consumer data information system operating on the basis of a time-sharing and multiple-program system whose basic functions are the gathering, storage, updating and retrieval of data with collective access.

4. The 1009 B system. This is an automated functional control and diagnosis system using digital printed circuits. It is used in controlling digital nodes using TTL elements--low, medium and high-level integration systems. In terms of its parameters it matches the top model of this type currently offered on the world market. A major advantage of the system is the possibility to work in two different ways. It has the self-correction and analysis possibility which is a required feature of any high precision and reliability testing equipment.

5. The IZOTKHROM microprocessor system for the automatic processing of chromatographic analysis data. The system was developed on the basis of a coordination plan drawn up by Ministry of Electronics and Electrical Engineering, Ministry of Chemical Industry and Bulgarian Academy of Sciences. The system offers the possibility of processing chromatograms of different types and levels of complexity. It has built-in standard chromatographic methods. It has been adapted for simplified handling and fast data printing. Unlike other similar systems, IZOTKHROM operates independently and may use all modern chromatographs and detectors. The system helps to automate the simultaneous results of four chromatographic detectors without changes in chromatographs or laboratory methods used. The system considerably upgrades the quality of analyses and facilitates the work of laboratory personnel.

6. A system for controlling powerful MPU-101 reversing current rectifiers.

7. The "700 Program" is a programmed automated control system based on microprocessors. It can control discrete processes in the course of the production process, describable through relay circuits and boolean equations. Each 10 ms the processor block receives the input data from the input-output blocks, processes them as programmed and provides the results at the output through the input-output blocks. This is accomplished on the basis of an easy program language. It can be easily applied to perform various functions based on consumer requirements. The exhibits include various programs, a control of a line for galvanized lining and control of combined machine units.

8. The ATTaM 400. This panel is a quasielectronic switching system used for the automation of office telephone communications. It is based on the module principle which insures the more efficient use of the equipment at different schedules and provides greater functional possibilities. Control is based on the M 400 microprocessor. The system may be adapted to various signaling systems and makes it possible to provide additional services to subscribers and convenient servicing methods.

9. The IDAS PROKON information-dispatcher automated production control system. It was developed by the TsNIKA of the Ministry of Machine Building. The system collects, processes, records and retrieves a variety of industrial information for a given production unit (sector, shop and others). It makes it possible to control a variety of parameters (discrete, digital, analogue) and engage in a "dialogue" with the production personnel. It is a centralized system which may operate autonomously or combined with a centralized control by SM KIM. It has a broad range for contacts with the production personnel: panel, workplace, miniterminal, and wide print.

10. Medium wave SV-100 radio transmitter, developed by the scientific center for heavy electronic equipment in Sofia. The SV-100 automated radio transmitter may be used for radio broadcasting within the 525-1605 kHz frequency range with a 100 kW nonmodulated frequency power. The transmitter operated at temperatures ranging from +10 to +40 degrees centigrade, an atmospheric pressure not below 570 mm and 90 percent relative humidity. It has a modular design which facilitates its assembly and transportation.

In addition to the exhibits which were awarded gold medals the electronics exposition includes a number of other systems for automated control and data gathering and processing as well as other modern electronic equipment which, even though they were not awarded gold medals, are of great interest to many Bulgarian and foreign consumers of items such as the "1001 S microprocessor handling system," which control the presence and traffic of workers and employees; a "System for the Processing of Bookkeeping-Economic Data," used in gathering and primary processing of economic data at their place of origin; a "typing and text processing system," for the automation of typing operations in typing, editing and multiplication of texts; a "System for the Digital Control of Metal Processing Machines," for the automated machining of rotation-symmetric parts; a "system for temperature control in industrial sites," which regulates the temperature in the individual working areas of machines used in the manufacturing of plastic materials, drying installations, furnaces and others; a "Data Recording System," for measuring and printing on a paper ribbon results of the measurement of different physical values; the "MIS LOKON Microprocessor Local Control Information System," used in controlling the pollution of the air and water of a specific area; a "System for Dispatcher Communications in Agriculture," for insuring telephone communications among subscribers using individual facilities and possibilities for communications among subscribers within an internal radio circuit; "Systems for Automatic Supervision and Control of the Work of Agricultural Machinery" (USAK--automatic control of the working parts of machines; SAV--automatic operation of self-propelling combines; KEDR, SAKS and USKS--for sowing operations control; and SEATs--an automated sugar beet plant thinner); a "Graphic Information System," for blueprint drafting, tracing printed circuits, and formulating programs for the control of metal cutting machines; "Sound Systems for Closed and Open Areas;" a "Navigation Radar System," for safe navigation under poor visibility conditions, safe crossing of straits, maneuvering, bypassing and locating the position of ships.

Household radioelectronic equipment was also exhibited, such as radio receivers, hi fi sets, radio earphones, television receivers and others.

The increased variety of Bulgarian electronic products, particularly in the area of completed systems which may be applied in all economic areas, and the enhanced technological standard of output are guarantees of the faster use of electronics in the national economy and social life in our country. All this can only please the Bulgarian people, whether specialists in electronics or ordinary visitors of the Bulgarian electronic exhibits at the 36th International Fair in Plovdiv.

5003
CSO: 2202

BRIEFS

NEW CSSR COMPUTER--The Mathematical Machines Research Institute in Prague has been working on a new computer designated EC 1027. Compared with the EC 1025, the new model will have a higher output and superior functional features, increasing the storage capacity about 4-fold and the number of operations to approximately 80,000 per second. During the Seventh Five-Year Plan, the EC 1025 computers will represent about 70 percent of the computers operating within the CSSR standard computer system. [Prague SVOBODNE SLOVO in Czech 6 Mar 81 p 3]

CSO: 2402

RAPID ADOPTION OF PRINTED CIRCUIT DESIGNING, TESTING SYSTEMS

Budapest NEPSZABADSAG in Hungarian 27 Feb 81 p 6

[Text] The AUTER [Automatikus Tervezes es Realizas, Automatic Designing and Realization] System was primarily a computer program system for designing printed circuits and testing them through simulation before they went inot production. Initially it operated on an R-10 computer backed up by an R-30. Since then, because of improvements in the R-10 and the evolution of minicomputer systems, the AUTER has been developed further with aid of the KFKI's [Central Physics Research Institute] TPA 1140 small computer which provides not only conditions more favorable for designing printed circuits but is cheaper than the R 15, the more advanced model of the R-10. In the meantime the computer programs continued to be refined. Most important, this work was not mere replication of latest foreign research but proceeded parallel to it.

Although AUTER was the basic designing system, the project has broadened since 1975 and turned into the TGE [Tervezes, Gyartas es Ellenorzes, Designing, Producing and Testing] system. This system expanded, made contact with industry, adapted to its needs and has begun to be introduced in factories. This has been due partly to the fact that the National Technical Development Committee and the former Ministry of Metallurgy and Machine Industry advertised a limited competition aimed at promoting industrial adoption of AUTER. TERTA [The Telephone Factory], BGH [Beloiannisz Hiradastechnikai Gyar, Beloiannisz Communications Engineering Factory], and EMG [Elektronikus Merokeszulekek Gyara, Electronic Metering Devices Factory] the winners of the competition, received substantial material support enabling them to purchase equipment needed for introducing the system to industry.

According the Imre Varadi, managing director of TKI [Tavkozlesi Kutato Intezet, Telecommunications Research Institute], further impetus to the process resulted from the fact that all institutes and enterprises interested in adoption of TGE joined forces to form KPAT [Kutatasi, Fejlesztesi es Alkalmazasi Tarsulas, Research and Development and Applications Association]. "Work related to development and industrial deployment was coordinated," he explained; "achievements attained at participating Hungarian institutions were integrated, and we helped enterprises plan and introduce their TGE systems."

Through KPAT, enterprises also collated their plans, compared their equipment and made a compilation of the equipment available. This has resulted in a unique type of cooperation in the course of which a joint pool of spare parts for equipment purchased abroad has been established; identical machine parts and computer programs are being used, and the specialists involved maintain continuous and direct contact with one another.

TERTA must design 200-400 new printed circuits plus redesigned modifications annually for its transmission and computer engineering products. Since this could not be done manually, it switched to the AUTER System but had to farm out the work to the TKI. Although this speeded up actual processing, demand on TKI from other sources for similar service was so great that TERTA had to wait long for its turn. After TERTA purchased a sophisticated production line that made printed circuit cards economically, as well as an efficient computer-controlled assembling and testing system, it became expedient to computerize designing and to document the designing which serves as basis for a final check.

Although adoption of the TGE system cost TERTA 200 million forints, it has paid off. According to their calculations, they will have a production capacity which will remain technically modern and rentable for 10-12 years. The cost of the system, even under present circumstances when peak capacity has not yet been attained, will be realized in three-and-a-half years. Furthermore, it now takes two-three months less than the previous eight-nine months to create a prototype. In view of TERTA's new products and exceptionally efficient TGE system, firms from industrially developed countries have brought offers of cooperative deals.

EMG switched to automated printed circuit design in the 1970's to overcome lack of draftsmen and to cope with increased complexity of design. To enhance precision of its product, it was soliciting bids for costly equipment from foreign firms when the KFAT was established. Through this a link was established with the KFKI and the TKI and, as result of winning the OMFB and KGM competition, the EMG received access to material resources. The installation of equipment was completed last year with virtually inconceivable rapidity.

Bigs sums are involved at EMG: printed circuitry accounts for 70 percent of the final value of its installations. Their required reliability can be attained only through computer devices which in the case of export of computer controlled processing centers--which the EMG also makes--is a matter of survival.

BHG manufactures principally telephone exchanges, largely for export. Since such exchanges are largely electronic, the factory found it necessary to use computers in designing, fabricating and testing printed circuits in the early seventies. It needed its own AUTER system by which run-through time for such circuits was reduced from 30 to three days. The TGE system now being set up at BHG is adapted to requirements for electronic telephone exchanges. An excellent circuit fabricating plant, purchased abroad, was established here as early as 1978. However, it could be used to capacity only with film and punch tapes produced with the aid of a computer. The final checking out of the circuits is performed on the "Tesztomat" installation which can also be used, via the AUTER system, to prepare the inspection program required. "Tesztomat" is a product of the Computer Technology and Automation Research Institute [SZTAKI]. Implementation of the TGE system speeds up designing, leads to more efficient and precise production and provides the initial documentation for testing. At present the programs that control the semi-automatic devices inserted into the circuits do not derive from AUTER, but a direct linkage of the two systems is now in progress.

CSO: 2502

FASTER METHOD OF DETERMINING CHOLINESTERASE ACTIVITY

Budapest ORVOSI HETILAP in Hungarian Vol 122 No 4, 25 Jan 81 pp 221-222

HIDEG, Zsuzsanna; National Institute of Forensic Chemistry, Budapest

[Abstract] Based on the modification of the Ellman method, a simple spectrophotometric procedure was developed for the rapid, quantitative determination of cholinesterase activity in whole blood. Reagents used are: 40 mg acetylcholine iodide in 1 ml distilled water--freshly prepared; 10 mg DTNB dissolved in 100 ml m/15 Sorensen phosphate buffer at pH 7.2. To 6 ml of the buffer, 6 ml distilled water and 0.01 ml whole blood is added. The mixture is incubated for 30 minutes at 20° C and divided in two parts. To one part, 0.1 ml acetylcholine solution is added. Promptly it is read, for 5 minutes at 426 nm, against the substrate-free blank. A Pye-UNICAM SP 1800 spectrophotometer and 1 cm quartz cuvettes were used. Compared to the standard Michel method, the modification requires about one-tenth of the time and has a standard error about one-thirtieth of the former. It requires only a spectrophotometer and can be used to determine the cholinesterase activity of blood samples from decomposed cadavers. References 7: 4 Hungarian, 3 Western

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